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Controlling
DODDER
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U.S. DEPARTMENT OF AGRICULTURE FARMERS' BULLETIN NO. 2211

200 Controlling Dodder in Alfalfa

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conrad

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Dodder is a parasitic twining weed that attacks alfalfa, lespedeza, and other crop plants. In areas of the North Central and Southern States, this weed often prevents production of lespedeza seed crops. It is especially troublesome in alfalfa seed-producing areas of the West, and on some farms has put an end to profitable growing of alfalfa for any purpose. Where dodder infests alfalfa or lespedeza seed crops, it causes large money losses by reducing seed yields, lowering seed quality, interfering with machine harvesting, and adding to the cost of cleaning seed. Other crops in which losses result from dodder infestation include clovers, flax, onions, sugarbeets, some ornamentals, carrots grown for seed, and potatoes.

All the States have laws restricting the amount of dodder seed that may be contained in crop seed offered for sale. Despite such laws, the weed continues to increase rapidly in many of the areas where growing conditions favor it. Its presence should be considered a serious threat wherever crop plants susceptible to it are grown.

Like other troublesome weeds, dodder has different names in different localities. Common names in addition

to dodder include love vine, strangleweed, devilsguts, goldthread, pull-down, devilsringlet, hellbind, hairweed, devilshair, and hailweed. Some species of the weed are called by names that refer to the plants on which the weed lives; examples are alfalfa dodder and clover dodder.

A farmer can prevent dodder from getting onto his farm, or spreading from field to field, much more easily than he can eradicate it after it has appeared. Therefore, every effort should be made to prevent the establishment of dodder. When the weed is found on a farm, a plan of attack should be carefully drawn up and then faithfully followed. Such a plan should take into account whether the infestation is widespread, or in localized patches, and whether a different cropping system might well be substituted in order to cope with the dodder.

DODDER SPECIES

Many species of dodder look very much alike, and are difficult to tell apart.

The three species of dodder that cause the most damage in the United States are:

Largeseed dodder (*Cuscuta indica*), smallseed dodder (*Cuscuta planiflora*), and field dodder (*Cuscuta campestris*).

¹This publication is based on results of cooperative research between the Plant Science Research Division, Agricultural Research Service; and the Utah, Washington, and Wyoming Agricultural Experiment Stations.

Largeseed dodder shows a decided preference for legumes, particularly alfalfa. It attacks a number of other plants, also. It is common in the West, rare in the East, and found occasionally in the South.

Smallseed dodder causes serious losses in alfalfa in the West, but is not found in the East. This species has smaller stems and makes much less growth than others. Smallseed dodder germinates at lower temperatures than the other two species. It therefore emerges earlier in the spring (mid-March in the Pacific Northwest, but may be earlier or later in other areas).

Field dodder is one of the most destructive of all dodders. It grows on most legumes and also on many other broadleaf plants, showing little preference among its hosts. It attacks lespezea more commonly than other dodder. In the Pacific Northwest it is the most troublesome dodder on alfalfa. Field dodder grows in most parts of the United States.

DODDER CHARACTERISTICS

Dodder Seed

Seeds of largeseed and field dodder are similar to alfalfa seed in size and density; seeds of smallseed dodder are smaller than alfalfa seed. Dodder seeds are gray to brown, irregularly round, and have a rough surface texture. They are produced in abundance where dodder is allowed to mature and may be spread about the field as the crop is harvested.

Usually more than 90 percent of dodder seeds have hard seedcoats. These seeds lie dormant in the soil until the seedcoat becomes permeable

to water, which may not occur for years. Hard seeds make dodder difficult to control for two reasons:

- Some seeds continually become able to germinate. Consequently, new seedlings may emerge throughout much of the growing season, if the surface soil is moist.
- Only a small part of the total seed population in the soil germinates in any single year. Once a field is infested, a dodder problem can be expected each year for many years. How long dodder will remain viable in soil is not known, but periods of 10 to 20 years may be possible.

Dodder Seedlings

Dodder emergence has been recorded from depths as great as 4 inches in the soil. However, most seedlings emerge from the surface inch. Dodder seedlings are rootless and leafless, consisting simply of a fine, yellow, threadlike stem. They usually are 1 to 3 inches long and often are hard to find.

Each seedling emerges as an arch, straightens out, and begins to rotate slowly. On contacting any elongated object, the seedling twines about it. If the object happens to be the stem of a suitable host plant, dodder sends suckers (called haustoria) into it. The dodder seedling's direct connection with the soil then withers, and it lives competely at the expense of the host plant. Failing to attach to a host plant, dodder seedlings die.

The Dodder Plant

After attachment to the host plant, the dodder seedling produces numer-



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Dodder on alfalfa in a vegetative (prebloom) stage.

ous stems. These grow rapidly, and reattach to other host plants. Stem growth of 3 inches per day has been recorded.

Dodder commonly appears first as scattered patches. If the alfalfa crop is grown for seed and the dodder is allowed to mature, it may be spread widely, over large parts of the field.

Largeseed and field dodder form tangled yellow mats through and on top of the alfalfa. A single plant of these species may spread to a diameter of 10 feet or more. Smallseed dodder does not become as large, but forms a dense growth near the base of the alfalfa.

During late spring and much of the summer, dodder bears massed clusters

of flowers, which may be white, pink, or yellowish. The numerous flowers produce abundant seed, which either falls to the soil or is harvested and contaminates the alfalfa seed.

Largeseed and field dodder require open sunlight to make best growth. When seedlings emerge from a soil shaded by dense alfalfa foliage, attachment may be reduced more than 90 percent. Seedlings that do attach in shade grow and develop slowly. Most dodder that causes trouble becomes attached when the crop plants are small or after a hay crop has been removed. You must be sure to provide effective control measures during these critical periods when shade is not present.

Weeds as Hosts to Dodder

Some species of dodder that infest crop plants also have a large number of hosts among wild shrubs and herbs. These include field bindweed, lambs-quarters, Russian-thistle, chickweed, willow, aster, sagebrush, goldenrod, ragweed, nettle, purslane, pigweed, sunflower, wild carrot, shepherds-purse, dandelion, viburnum, marshelder, and horse-nettle. Dodder seedlings often make their first attachment to weed seedlings. From these they spread to crop plants. General weed control is therefore an aid to dodder control. Even if susceptible crops are not being grown on a dodder-infested field, dodder can grow on weeds, and add dodder seed to the soil.

HOW DODDER SPREADS

When dodder makes its first appearance on your farm, this is likely to

mean that you have planted dodder seed. Often you may do so if you use crop seed that was grown by a neighboring farmer or that you bought without learning its source. If you allow even a few dodder plants to produce seed, within a few years the dodder seed may be scattered over the whole field when you harvest with a combine.

You are also likely to spread dodder by moving a combine from field to field or from farm to farm without cleaning it properly. Manure or mud containing the seed adheres to farm equipment, animals' hooves, and men's shoes, and thus is carried from place to place.

When you transport and feed hay containing dodder seed, you likewise spread the weed. Dodder cut with a hay crop may mature seed even if it was only in the flower stage when cut.

Dodder seed can pass through the digestive tract of an animal and still germinate. Fields can be infested with dodder by spreading manure from animals that have eaten hay containing dodder seed.

Irrigation water may carry dodder seed from field to field.

The following practices help prevent the spread of dodder:

- Do not sow crop seed that contains dodder seed. As far as possible, plant only tagged, certified seed or other seed of known purity.

- Before moving a combine or other farm equipment from a field known to be infested with dodder to one not known to be infested, clean the equipment thoroughly.

- If you feed hay containing dodder seed, confine the animals to a feedlot, to the field where the hay originated,

or to a field where susceptible crops are not likely to be grown. Forage crops infested with immature dodder can be harvested with a field chopper, to be dehydrated and made into alfalfa meal or to be fed green or as silage, without danger of spreading viable dodder seed.

- Do not spread on dodder-free land any manure that you suspect of containing dodder seed.
- Do not allow dodder to grow along irrigation ditches where water could carry the seed from place to place.

CONTROLLING DODDER IN SEED CROPS

Dodder control in seed crops has two aims. These are—

- To prevent losses in crop yield and seed quality caused by dodder.
- To prevent dodder from producing seed.

When only a small amount of dodder is present, so that it occurs only in scattered patches, it usually is best to let the dodder attach to the crop plant and grow large enough to be seen easily. Then, you can destroy the individual patches before they set seed. If dodder infests a large part of your field, you must follow a carefully planned, full-season program on the whole field; dodder seedlings must be killed before they can become attached.

Scattered Patches

At the present time, there is no satisfactory way of destroying attached dodder without also killing the host plant to a point below where the dodder is attached. You should plan to use these methods only if the infestation



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Smallseed dodder is fine stemmed, has small flowers, and grows near the base of the host plant. Field dodder (shown on cover) has larger stems and flowers.

is small enough so that the resultant loss of alfalfa does not exceed the value of controlling the dodder. Use the methods under "Widespread Infestations" on fields where dodder is more abundant.

As the first step in controlling a scattered infestation, go over the whole field, locate the patches, and mark them. Use one of the following methods, and treat several feet beyond the apparent edge of each patch to be sure you kill all the dodder. Revisit the field at 2-week intervals to find any new patches, and to be sure no dodder has survived in the treated patches. Place a permanent marker in each patch so it can easily be checked in subsequent years.

You can control a scattered infestation by flaming, by cutting, or by combining these two methods.

Flaming

Flaming with a weed burner destroys dodder patches effectively at rather low cost. Burners fueled with propane or butane have proved to be best suited to this purpose.

For best results, kill the top growth with a light flaming and then go back several days later, when the vegetation has dried, and burn the patches clean.

Cutting

You may cut the host plants below the point at which the dodder is attached. Either remove cut vegetation from the field in sacks or burn it on the spot. You may add dry straw or fuel oil to make a better fire.

Widespread Infestations in Irrigated Alfalfa

Detailed methods for controlling widespread infestations of dodder in seed crops have been developed only for alfalfa grown under irrigation. When a field has too much dodder for spot treating, the whole field must be treated. Unlike spot treatment, in which the host plant and the dodder are destroyed *after* the dodder is attached, widespread infestations require methods that kill dodder seedlings *before* attachment without harming the crop plant. Because dodder continues to emerge throughout the spring and summer, control must be provided during a period of 4 to 5 months.

Effective methods of killing dodder seedlings are available, but no single method will give control for this entire

period. Therefore, you must depend on a combination of methods to get full-season dodder control. Unless you carry out the program precisely, a gap in the continuous process of control may result. When this occurs, the cost of the program, which is high, is largely wasted.

You must plan a detailed dodder control program for your own farm, in advance of the growing season. Then, you must carry out the program faithfully, so that dodder control is continuous during the critical 4 to 5 months.

Available methods seldom give 100-percent control. However, if you precisely follow the programs outlined in this bulletin, you can control dodder on even the most heavily infested fields to the point where individual patches that escaped control can be destroyed by spot treatment.

Dodder can be controlled in alfalfa by frequent tillage, natural occurrence of dry soil and shading, destruction of stubble and attached dodder, and use of herbicides.

Tillage

Being rootless, dodder seedlings are easily dislodged from the soil by tillage. They die if they are buried or become dry. Dodder does not dry out as readily as many other plants. Therefore, repeated tillage is necessary to assure that no seedlings survive to attach to the alfalfa.

During certain times of the year, you can safely use several different tillage implements in alfalfa to kill dodder seedlings. Take full advantage of this inexpensive control method, in order to shorten the period when con-

trol must be provided by herbicides. Alfalfa growth is slowed down by tillage, but it picks up uniformly when tillage stops, and no permanent unfavorable effects on it have been noted.

Beginning in March, till with such implements as the skew-treader, finger-weeder, flextine harrow, or combinations of these tools, the choice depending on soil conditions. Some alfalfa seed growers use a disk successfully. The disk provides excellent dodder control, but deep disking may injure the alfalfa. Tillage with any implement gives good results if it thoroughly stirs the surface soil, exposing it to drying.

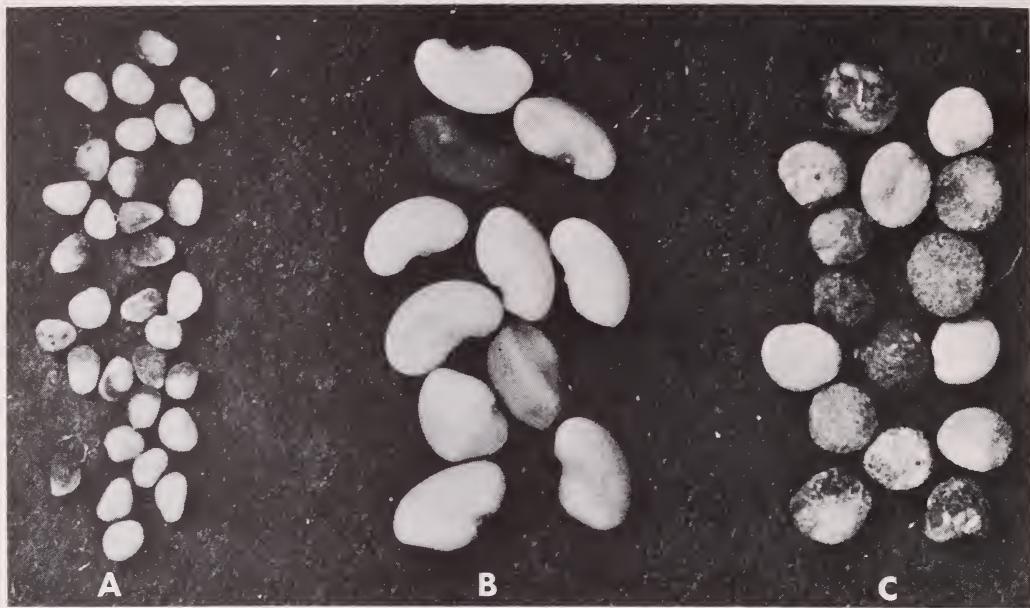
Soil tilled first with a skew-treader becomes loose and easily worked. You can then do subsequent tillage effectively with a finger-weeder or tine harrow.

Stubble tillage may be important in preventing a break in the full-season dodder control program. This is especially true when soil moisture is favorable for dodder emergence when



BN-5436

A heavy infestation of field dodder.



BN-5433

Seeds of smallseed dodder (A), alfalfa (B), and largeseed dodder (C), magnified to four times their actual size. The seed of dodder is especially hard to clean from alfalfa. Dodder seed has rough seedcoats, whereas alfalfa seed has smooth ones.

the hay is cut, or if rains come before the hay is removed. If rain delays baling for several days, till between the windrows to kill dodder that would otherwise escape and disrupt the whole program. Dodder that becomes attached when alfalfa regrowth is small is the most destructive.

In areas where rainfall is scarce, but the water-holding capacity of the soil is sufficient to avoid the use of frequent irrigation, adequate dodder control often results from a dust mulch alone. Form the dust mulch at least 2 inches deep by frequent tilling until the field looks as if it had been plowed and harrowed to form a seedbed. The alfalfa will resume growth and, if the surface soil remains dry, good dodder control can be expected.

Determining Whether To Harvest Seed From First or Second Crop

The decision whether to harvest seed as the first or as the second crop of the season usually depends on factors such as the value of hay, the time of emergence of wild bees, the length of the growing season, and the average seed yields of first-crop and second-crop alfalfa under local conditions. Where good seed yields result from either first- or second-crop seed, as in most of the Pacific Northwest, you should plan to use about half of your acreage for each crop. This makes it much easier to meet the critical timing requirements for successful dodder control.

Dry Soil and Shading

Seeds of dodder do not germinate in dry soil. In irrigated areas of the West, the soil surface usually dries between irrigations, and you obtain a period of control simply because the dodder seeds do not germinate. Irrigate as infrequently as practical in order to allow the soil surface to be dry as much as possible.

Because dodder requires sunlight to attach and grow normally, the shade of vigorous alfalfa suppresses dodder enough to provide control.

The combination of shading by the crop and drying of the soil surface provides an important part of a total dodder control program. However, dodder control by dry soil and shading is of little or no value if dodder has escaped control earlier when the soil was moist and the alfalfa was not large enough to provide shade.

Destruction of Stubble-Attached Dodder

Sometimes you may produce second-crop seed where dodder has not been controlled in the hay crop. Destroy this dodder before applying herbicide. Soil-applied herbicides will not be effective in destroying this dodder. You must use some method that destroys the stubble and the attached dodder.

Any effective treatment delays the growth of the seed crop about 2 weeks. If you use these methods, do not treat so late that this delay in alfalfa development results in full bloom after the peak of pollinator activity.

Three methods are available:

Flaming.—You can use field burners fueled with butane, propane, or diesel oil. Intense heat is required to destroy succulent dodder and the woody alfalfa stubble to which it is attached. For best results, flame the field twice, the first time to sear the vegetation, and the second time to burn it completely.

Tillage.—Destruction of stubble-attached dodder by tillage requires vigorous methods such as disking. Dodder will die if the stubble to which it is attached is either severed from the crown or buried. The field should resemble a seedbed when finished. Under some conditions, such intense tillage can be harmful to the alfalfa crowns, and stand thinning may occur.

Contact herbicides.—The woody stubble of alfalfa is hard to kill with herbicides. Several contact herbicides have been tried but the results were not satisfactory.



BN-5437

Dodder seedling not yet attached to the host plant.

Critical Requirements for Successful CIPC Application

Distribution.—CIPC is the most widely used herbicide for dodder control. You must distribute the herbicide uniformly on the soil surface. Poor distribution results in untreated areas where dodder can emerge unharmed. Free-flowing fertilizer spreaders are not satisfactory for applying CIPC. Have the herbicide applied by qualified aerial applicators or use ground-operated spreaders that are specially designed for even distribution of granular pesticides.

Wind disrupts granule distribution. You may have to add metal, fabric, or plastic wind protectors if your spreader does not have them.

Moist surface soil.—Moisture is required for CIPC to move from the granules and contact the dodder seedlings. If you apply CIPC to a dry soil surface, dodder may emerge unharmed

from deeper moist soil. CIPC is most effective when applied as soon after irrigation or rainfall as the field can be driven on. CIPC applied by air before the field is dry enough for ground equipment has given excellent results.

The alfalfa foliage must be dry when you apply CIPC. If foliage is wet, the granules will adhere to the alfalfa and damage it, and dodder control will be less effective because all the herbicide does not reach the soil.

Timing.—Proper timing is of critical importance in dodder control. CIPC will kill dodder dependably only when applied before the seedlings become attached to the host plant.

Irrigation or heavy rainfall stimulates germination of seeds and emergence of new dodder seedlings. During warm weather, new seedlings may appear 3 days after watering. They may

Soil-Applied Herbicides

Established alfalfa is quite tolerant of CIPC. Research and farmer experiences over many years have shown that it consistently provides satisfactory dodder control when applied properly.

CIPC is registered for use in alfalfa grown for seed, hay, and forage.

Apply a granular formulation to the surface of moist soil at 6 pounds per acre. You can obtain this amount of CIPC by applying the common 20-percent-active commercial formulation at 30 pounds per acre. Such a treatment will control dodder for about 4 weeks.

This period is considerably less than the 4 to 5 months in which dodder control is needed. Therefore, you can expect full-season dodder control only when you carefully plan CIPC applications in conjunction with other control procedures.

Two other herbicides have recently been found effective against dodder. These are dichlobenil and DCPA. Both of these are presently (1969) registered for use in alfalfa for seed only. They are not registered for use in alfalfa for forage.

In addition to dodder, dichlobenil controls many other weeds that emerge from seed. It also suppresses certain

grow out of the susceptible stage in as little as 3 days after emergence. CIPC is most effective when applied shortly before or just as seedlings begin to emerge.

Under field conditions, you may find it difficult to observe the first emergence of dodder because the seedlings are small and inconspicuous. Applying CIPC shortly after irrigating assures proper timing with respect to seedling emergence and assures proper soil moisture for maximum effectiveness of the herbicide.

In May and June, apply CIPC within 5 days from the time irrigation is first applied. During cooler weather in the early spring, dodder germination and development is slower, and more time may pass after irrigation or rainfall before dodder leaves the susceptible stage. At that season, application need not follow as closely behind irrigation, and you can prepare twice as much area for treatment at one time.

established perennial weeds such as Canada-thistle, quackgrass, and dandelion. You should consider using dichlobenil for dodder control in alfalfa grown for seed when other weeds are a problem in addition to dodder.

For dodder control with dichlobenil, apply 2 pounds per acre. This amount of dichlobenil is contained in 50 pounds of a granular formulation which contains 4-percent active ingredient. Dichlobenil is very effective when applied just before sprinkler irrigation. It is also effective when applied soon after irrigation in the same manner as CIPC.

Level, clean field.—It is important that the soil surface be level and free of clods and debris so that even distribution of CIPC on the soil surface will result. Dodder control with CIPC is usually more effective on fields irrigated with sprinklers than on furrow-irrigated fields. Seedlings sometimes emerge unharmed on the shoulders of the furrows because the herbicide granules do not adhere to these areas.

Alfalfa ground cover.—Alfalfa growth 4 or more inches tall should be present when CIPC is applied. Shade from alfalfa keeps the soil surface cool and moist. This prolongs the persistence of CIPC.

CIPC is volatile and most dodder seedlings are killed by CIPC vapors. Alfalfa cover helps hold the vapors near the dodder seedlings and restricts loss by wind movement. Furthermore, the larger the alfalfa is when CIPC is applied, the more complete will the control be from shade when the herbicide is gone.

Some leaf discoloration and brittleness of stems can usually be seen in alfalfa treated with dichlobenil at 2 pounds per acre. Such injury is temporary and has not been found to affect alfalfa seed yields. You must be careful not to apply more than 2 pounds per acre at one time or more serious crop injury may result.

Like CIPC, dichlobenil is rather short lived in soil. At 2 pounds per acre, it will control dodder for about 4 weeks.

DCPA is formulated as a wettable powder and must be applied with a sprayer equipped with an effective agitator. The required rate of 10 pounds

Identity of herbicides discussed in this bulletin

Herbicide designation in this bulletin	WSSA ¹ designation	Chemical name	Trade ² name
CIPC.....	chlorpropham....	isopropyl <i>m</i> -chloro= carbanilate.	Cholor IPC.
Dichlobenil.....	dichlobenil.....	2,6-dichlorobenzoni= trile.	Casoron.
DCPA.....	DCPA.....	dimethyl tetrachloro= terephthalate.	Dacthal.

¹ WSSA is the abbreviation for the Weed Science Society of America.

² Trade names are used in this publication solely to provide information. Mention of a trade name does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture or an endorsement by the Department over other products not mentioned.

per acre is contained in 13.3 pounds of a formulation which contains 75-percent active ingredient.

DCPA is most effective when applied to the soil shortly before sprinkler irrigation or rainfall. Application to the surface of moist soil after irrigation usually is effective also, but this sometimes has failed to control dodder satisfactorily.

You should apply DCPA when there is little alfalfa growth present in order that the herbicide can reach the soil surface without being intercepted. DCPA is more persistent in soil than is CIPC or dichlobenil and controls dodder for 4 to 8 weeks. Alfalfa is very tolerant to DCPA and no symptoms of injury should be expected. DCPA is registered for use only on alfalfa grown for seed.

Precautions

Herbicides are safe when stored, handled, mixed, and used in accordance with label instructions and sound agricultural practices. Most herbicides are low in toxicity. However, some can be

injurious to man, animals, and plants if used improperly.

Most herbicides are toxic to many crop plants and ornamentals. Many are volatile and their vapors and spray drift will cause damage to desirable plants. Avoid spraying when windy conditions exist.

Keep herbicides away from children, livestock, and pets. Store herbicides in closed, well-labeled containers in a dry place where they cannot contaminate food, feed, or water.

When handling herbicides wear clean, dry clothing. Launder clothing after each spraying operation before wearing again.

Do not inhale herbicides and avoid contact with spray mist and drift. Avoid repeated or prolonged contact of herbicides with your skin. Avoid spilling herbicides on any part of your body—especially your eyes, nose, and mouth. If you spill any on your body, wash it off with soap and water and remove contaminated clothing.

To protect fish, wildlife, and livestock, do not clean spraying equipment or dump excess spray material near lakes, streams, or ponds.

Empty herbicide containers may be hazardous. Dispose of them in accordance with label instructions and the recommendations of your State extension weed science specialist or other local agricultural authorities. Do not burn herbicide containers.

DODDER CONTROL SCHEDULES

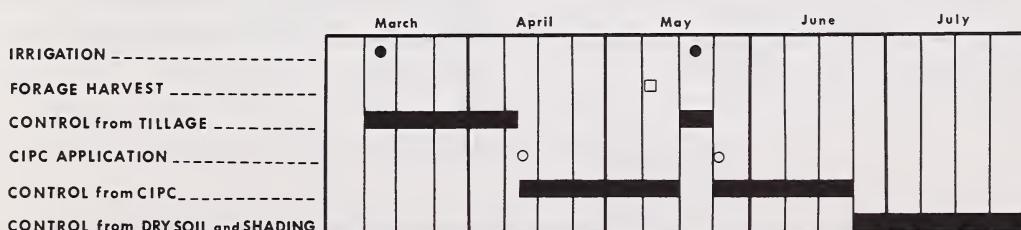
The need for careful timing of the CIPC application relative to irrigation makes dodder control a precise operation. If entire fields could be irrigated at one time, the job would be simplified. Since you must use many sets of water to cover your seed crop, dodder control on your fields must be handled on application units, rather than on large acreages. The size of the application units will depend on the area irrigated with each set of water and the duration of the sets. Usually you can handle the area of one to four sets of water as an application unit.

You must follow different dodder control schedules to fit in with irrigation as the season progresses. Four dodder control schedules are outlined in this bulletin. If followed carefully, each will provide full-season dodder control. The schedules are based on the use of CIPC. In the description for each, modifications for using dichlobenil or DCPA are discussed.

With these schedules as a guide, plan a total dodder-control program for each field of your farm, making your own schedules to fit your particular application units.

The calendar schedules apply to the alfalfa-seed-producing area of Walla Walla County, Wash., and Umatilla County, Oreg. With slight modifications, the schedules are applicable to other areas of the Pacific Northwest, such as eastern Oregon, the Yakima Valley of Washington, and the Boise Valley of Idaho. With further modifications to fit local conditions, they should be a useful guide for dodder control in other areas.

Schedule 1.—Second-Crop Seed



Schedule 1.—Control dodder by frequent tillage in March and early April. Apply the first irrigation any time during this period of frequent tillage, or you may apply it the previous fall or winter. The first CIPC application is not made in conjunction with irriga-

tion, but depends on rainfall or moist soil brought up by tillage to provide a moist surface. Therefore, you can prepare fairly large areas at one time for treatment with the first CIPC application.

Harvest forage in early May. Till the stubble immediately after removing the forage crop. Irrigate during the 2 weeks following the first tillage. Do additional tillage on those areas not irrigated within a few days after the first tillage, being sure to till each area just before applying water.

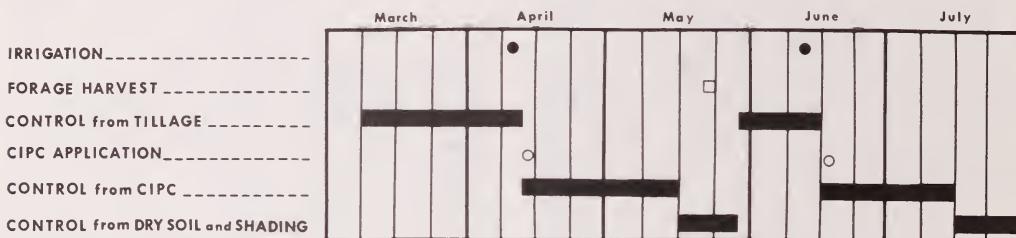
Apply CIPC shortly after irrigating. Ideally, the application units should consist of the area of only one set of water. However, you can usually include the area of two or three 24-hour

sets in one application unit without sacrificing satisfactory moisture conditions or timing.

If additional irrigation is required, delay it as long as possible. Dry soil and shading provide dodder control after the second application of CIPC becomes ineffective.

DCPA or dichlobenil may replace the second CIPC application. When sprinkler irrigation is used, the second irrigation should follow application to get maximum effectiveness.

Schedule 2.—Second-Crop Seed

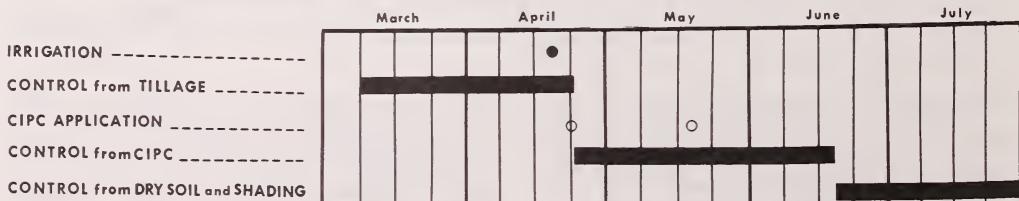


Schedule 2.—Control dodder by frequent tillage in March and early April. Irrigate during the first 2 weeks in April. Make the first CIPC application on soil moist from irrigation. Application units may be larger for the first application than for the second, and may consist of the area of three to five 24-hour sets of water.

Harvest forage in late May (about 2 weeks later than in schedule 1). Then till, irrigate, and make second CIPC application, as in schedule 1.

DCPA or dichlobenil may replace the second CIPC application. When sprinkler irrigation is used, the second irrigation should follow application to get maximum effectiveness.

Schedule 3.—First-Crop Seed



Schedule 3.—This schedule is applicable where no forage crop is harvested. Control dodder by frequent

tillage from early March until mid to late April.

Irrigate shortly after last tillage.

Make first CIPC application on soil moist from irrigation. Make the second application 3 to 4 weeks later. If you need to irrigate in May, make this second CIPC application as soon after this irrigation as the foliage is dry.

Use fall or winter irrigation with this schedule.

Dry soil and shading provide dodder control after the CIPC becomes ineffective.

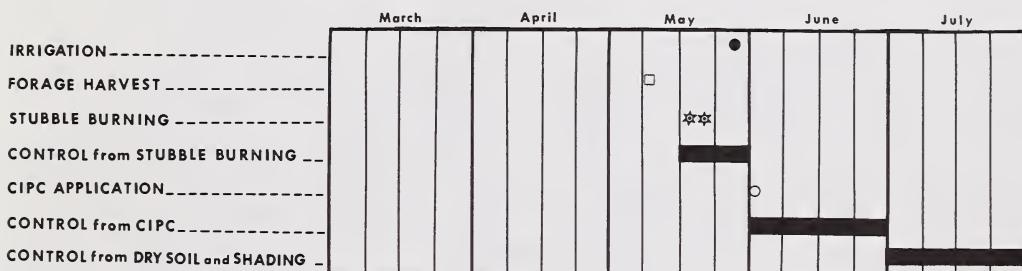
DCPA may replace the first CIPC application. Reduce the period of tillage and apply DCPA 1 to 3 weeks

earlier than the indicated first CIPC application. When sprinkler irrigation is used, irrigate shortly after application.

Under favorable conditions, one application of DCPA will provide satisfactory control. However, applying CIPC in May as indicated is good insurance.

Dichlobenil may replace the first or both applications of CIPC. When sprinkler irrigation is used, irrigate shortly after application.

Schedule 4.—Second-Crop Seed



Schedule 4.—This schedule is applicable where dodder was not controlled in the forage crop. After forage harvest, destroy dodder attached to the alfalfa stubble by flaming twice. Then irrigate and apply CIPC as in schedules 1 or 2.

Tillage in the stubble is usually unnecessary because flaming destroys

seedlings as well as attached dodder. However, if rainfall before irrigation brings on dodder seedlings in the stubble, you can control these by tillage.

DCPA or dichlobenil may replace the CIPC application. When sprinkler irrigation is used, irrigate shortly after application.

CONTROLLING DODDER IN HAY AND FORAGE CROPS

Where alfalfa is grown only for hay, dodder usually is not as troublesome as in seed production. The frequent mowing of hay does not allow dodder to mature much seed so dodder does

not spread nearly as easily as in alfalfa seed production.

If hay is heavily infested, CIPC treatments outlined for seed production can be used. However, it is questionable whether the return from hay production would justify the expense of more than one CIPC application. It is

often more profitable to harvest hay early so dodder seed does not mature.

If you harvest three crops of hay you can get acceptable dodder control by controlling dodder in the first crop with CIPC and tilling the stubble after the first crop is harvested. Dodder developing in the second and third crops of hay usually will not be too troublesome. If four or five cuttings are

made, you must control dodder in the first two or three cuttings.

Where a dodder infestation in alfalfa hay makes production unprofitable and the yield does not justify the cost of control, plow under the crop and grow a nonsusceptible one, such as small grain, corn, pasture grass, beans, or peas.



WARNING

Recommendations for use of pesticides are reviewed regularly. The registrations, at the Federal level, on all suggested uses of pesticides in this publication were in effect at press time.

CIPC is presently registered on an "extended" basis. This basis is not to exceed December 31, 1971. Prior to this time the registration will be reviewed and, where necessary, a numerical tolerance will be established.

Check with your county agricultural agent, State agricultural experiment station, or State department of agriculture to determine the registration status of CIPC and other pesticides suggested for use.

This bulletin supersedes Farmers' Bulletin 2117, "Dodder and Its Control"

Cover illustration: Field dodder in blossom overtops alfalfa

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